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Newton's second law of motion easy explanation

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Isaac Newton's Second Law explains what happens when an external force affects an object. As stated by NASA, this law says that "Force equals the change in momentum per change in time." In simpler terms, if you apply a constant force to an object, it will accelerate at the same rate every second. This is represented mathematically as F = ma, where F is the force applied and a is the acceleration. This principle was built upon earlier work by Galileo Galilei and Rene Descartes. Galileo's experiments showed that all bodies accelerate equally regardless of their size or mass. Newton also critiqued and expanded on Descartes' laws, which were very similar to his own first law of motion. The equation F = ma indicates that force and acceleration are vector quantities, meaning they have both magnitude and direction. When applying forces to an object, it's essential to consider the net force acting on it (∑F = ma). This concept can be complex when dealing with multiple forces or forces applied for a limited time, producing what is called impulse. Certain forces can alter an object's velocity, causing it to speed up, slow down, or change direction. This continued motion is then maintained at a new constant velocity, as long as the force does not cease. However, one type of force remains consistent - gravity, which attracts massive bodies towards each other. When this occurs, the resulting acceleration due to gravity can be represented by g. In such cases, Newton's Second Law becomes F = mg, where mass and gravitational acceleration are multiplied together to give weight, another form of force. To counteract gravity and lift a massive object, an upward force (ma) greater than the downward gravitational force (mg) must be generated. Rockets exemplify all three laws of motion. Forces exerted by engines can change their speed or direction. In return, Newton's Third Law dictates that a body exerts a reaction force equal to and opposite from the force applied to it. When a force is applied to an object, it causes that object to accelerate according to Newton's Second Law of Motion. The larger the object's mass, the more force is required to achieve the same level of acceleration. This law also explains deceleration, which occurs when a force opposes an object's motion. For example, a ball rolling down a hill accelerates due to gravity, while a ball being rolled up a hill decelerates as gravity acts in the opposite direction. Newton's Third Law states that for every action, there is an equal and opposite reaction. This means that when you push on an object, it pushes back on you with the same magnitude of force. Additionally, Sir Isaac Newton described three laws of motion in his 1687 book "Philosophiae Naturalis Principia Mathematica", which are still used today to describe the relationship between an object's motion and the forces acting upon it. Newton's laws describe the relationship between an object's motion and the forces acting upon it. The first law states that an object at rest remains at rest, or an object in motion continues to move, unless acted upon by an unbalanced force. This describes inertia, where a body resists changes in its state of motion. Examples of this law include: a dropped ball falling, a rolling cart continuing to roll, and an apple staying still on a table. The second law relates the force applied to an object's acceleration. The equation F = m*a shows that force is equal to mass times acceleration. This means that heavier objects require more force to accelerate than lighter ones. Illustrations of this law include: it taking more effort to move a heavy box, a truck taking longer to stop than a car, and getting hit with a fast-moving baseball causing greater harm due to the increased acceleration. The third law states that every action has an equal and opposite reaction. When one object exerts a force on another, the second object also exerts a force in the opposite direction, of equal magnitude. This is evident when you push someone wearing roller skates, you both move together, or when a jet engine produces thrust as hot gases exit the engine. #